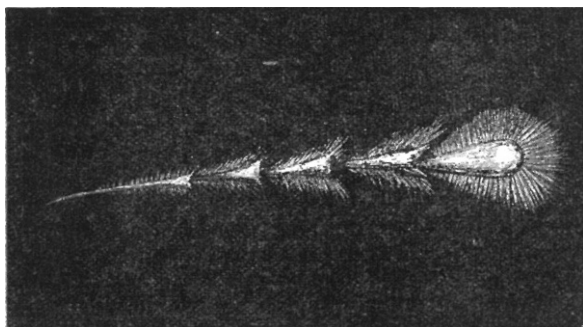


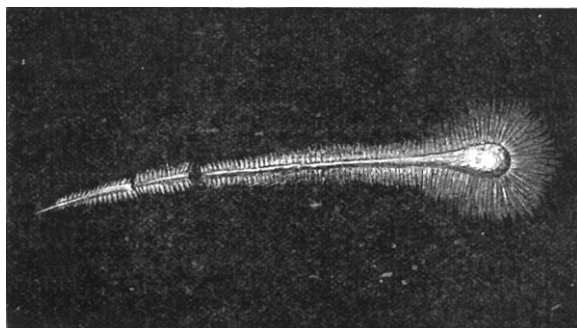
A MAGNIFICENT METEOR.

WE have received from Mr. C. Weatherall Baker (who writes from Penang) the following notes on a magnificent meteor seen from the s.s. *Prometheus* in longitude 62° E., latitude $10^{\circ} 20'$ N., at 10.40 p.m. on Friday, April 6, 1888:—

"It rose from the north by west horizon, and, passing behind a small cloud, travelled in a south by east direction, being at one period of its transit immediately above the ship. Sketch A represents the meteor when in that position. It traversed the whole arc of 180° , and was visible from first to last with the exception of the time when it was behind the small cloud before mentioned, the transit occupying about 30



A.—View as seen directly over ship at 10.40 p.m.



B.—View as seen shortly after appearing.

seconds. When directly above the ship, the head appeared as near as possible the size of the moon when at its height, and the tail streamed out as in the sketch, to a length of about 15 diameters of the head. It was a brilliant white, and threw shadows on the deck as dense as those caused by the moon at the full. Sketch B represents the meteor as it appeared a few degrees above the horizon on its upward course, and on reaching the same distance above the south by east horizon it was simply a dull red ball with no tail whatever. Captain J. K. Webster, of the s.s. *Prometheus*, who has had many years' experience in most parts of the world, tells me that he has never seen a meteor in any way equalling this one for size or brilliancy."

NOTES.

THE Council of the Royal Meteorological Society have issued a circular requesting that photographs of lightning may be sent to them. In response to a similar appeal last year, about sixty photographs of lightning-flashes were received from various parts of Europe and America. The Council remind photographers, amateur and professional, that the photography of lightning does not present any particular difficulties. "If a rapid

plate, and an ordinary rapid lens with full aperture, be left uncovered for a short time at night during a thunderstorm, flashes of lightning will, after development, be found in some cases to have impressed themselves upon the plate. The only difficulty is the uncertainty whether any particular flash will happen to have been in the field of view. A rapid single lens is much more suitable than a rapid doublet; and it is believed that films on paper would effectually prevent reflection from the back. The focus should be that for a distant object; and, if possible, some point of landscape should be included to give the position of the horizon. If the latter is impossible, then the top of the picture should be distinctly marked. Any additional information as to the time, direction in which the camera was pointed, and the state of the weather, would be very desirable."

THE Kew Bulletin for June contains, besides an account of the manufacture of quinine in India, papers on "Job's Tears" (the round, shining fruits of a grass widely distributed in tropical countries, and used by the Karens for the decoration of clothing); on China grass or Ramie, the fibre of which, if it could be extracted and cleaned at a cheap rate, would have great economic value; and on a new botanical station at Lagos, which promises to exercise a very favourable influence on the industrial development of the West African colonies.

SOME time ago the Agassiz Association appointed a Committee to arrange for a seaside meeting during the present summer. This Committee, according to *Science*, proposes that the meeting shall be known as the "Agassiz Seaside Assembly." Its membership is to consist of such persons as shall send their names to the secretary before the opening of the assembly, or such as shall be elected members according to by-laws adopted afterwards. It is intended that the organization shall be made permanent. A six-days' session will be held this year, at Asbury Park, N.J., provided suitable accommodations can be secured at that place in the month of August. The subjects to be discussed this year will be principally botany and entomology, under the direction of such practical specialists as can be secured. The work is to include several field-day excursions with experienced guides.

THE heat in India lately has been unprecedented, in consequence of the delay of the monsoon. On June 24, when the Calcutta Correspondent of the *Times* despatched a telegram on the subject, the temperature was the highest that had ever been registered. Professional business was almost entirely suspended, and trading operations were greatly hampered. Many persons had suffered from heat-apoplexy and sunstroke, some cases having terminated fatally.

A *conversazione* was given yesterday evening by the President and Fellows of the Royal College of Physicians, at the College. The President of the Society of Telegraph-Engineers and Electricians, and Mrs. Graves, have issued invitations for a *conversazione* in the galleries of the Royal Institute of Painters in Water Colours on Tuesday, July 10.

A REMARKABLE new series of compounds of silicon tetrafluoride with organic derivatives of ammonia have been prepared by Messrs. Comey and Loring Jackson, of Harvard. Many years ago, Gay Lussac and Thénard discovered that silicon tetrafluoride formed with gaseous ammonia a singular compound, $2\text{NH}_3 \cdot \text{SiF}_4$; this substance, which is comparatively stable in air and distinctly crystalline, is decomposed by water with formation of ammonium fluoride and silicofluoride and deposition of silicic acid. The American chemists now show that a very large number of substituted ammonias form similar compounds, and give an interesting description of the methods by which they have isolated the most important members of the series. Aniline forms two such compounds; the most stable being represented

by the formula $3C_6H_5NH_2 \cdot 2SiF_4$, and the other $2C_6H_5NH_2 \cdot SiF_4$, corresponding to the well-known compound with ammonia itself. The first was obtained by passing gaseous tetrafluoride of silicon over aniline, the gas delivery tube not quite touching the surface of the aniline so as to avoid the stoppage of the passage by the solid product. The combination is so rapid that practically all the fluoride is absorbed, considerable heat being evolved during the process; and, which is very satisfactory, the reaction is one of the few quantitative ones, the whole of the aniline being eventually converted into a loose white crystalline solid, which sublimes about $200^\circ C$. without fusion. This new substance is further remarkable by being insoluble in the usual organic solvents, alcohol alone slowly acting upon it with decomposition. Brought in contact with water it is at once decomposed with deposition of silicic acid; the solution, on evaporation, yielding beautiful pearly tabular crystals of aniline fluosilicate, aniline fluoride remaining dissolved. When aniline vapour was conducted into a receiver filled with silicon tetrafluoride the second compound was formed as a white powder, decomposing when warmed or when treated with water and even spontaneously on keeping. From the fact that the products of spontaneous decomposition are the first compound and free aniline, it is very probable that the true formula is $4C_6H_5NH_2 \cdot 2SiF_4$, double the empirical formula; and it is evidently more than a mere coincidence that the values obtained by Mixter for the vapour density of the ammonia compound also point to the fact that its real composition is $4NH_3 \cdot 2SiF_4$.

A SEVERE shock of earthquake was felt in the Hernö, an island in the Baltic, on June 7, at 7.24 a.m. Houses shook, and furniture moved. The shock went in a direction north-north-west. At the Lungö Lighthouse the shock was felt at 9.50, and was accompanied by a detonation like that of heavy artillery. Here the shock went in a direction north-east to south-west. The shock was also felt in the town of Hernösand.

A SPECIAL Committee, under Prof. Mushketoff, appointed to inquire into the causes of the earthquake which nearly destroyed Vyernyi, in Russian Turkistan, on June 9, 1887, has delivered its report to the Russian Geographical Society. The Committee, which consisted of four mining engineers and several topographers, began its work in August with a systematic exploration of the crevices in the buildings and the soil, both at Vyernyi and in the surrounding region as far as Lake Balkhash, Kulja, Lake Issyk-kul, and Tashkent. Detailed maps were made, and numerous photographs taken of the destroyed buildings. The chief shock of earthquake took place at 4h. 35m. a.m. on June 9; it destroyed nearly all the stone buildings of Vyernyi. It was followed at 4h. 45m. by another severe shock. Severe shocks continued for nearly half an hour, at intervals of one minute, and they were succeeded by feebler shocks which were felt throughout the day. Nearly 1500 stone houses were destroyed, while scarcely any harm was done to houses made of wood. Of a population of 30,000, no fewer than 332 persons were killed. The shocks continued almost every day throughout the months of June, July, and August; since September they have not been so frequent, but they go on still, and on March 4, 1888, there was a rather severe shock. The total number of shocks noticed (without instruments) reaches more than 200. It appears that the wave of earthquake had its origin in the south of Vyernyi, in the Alatau Mountains; and in the spur of mountains which separates the Kaskelen and the Berezovaya Rivers, the Expedition discovered at a height of from 5000 to 6000 feet a region where a dislocation of the rocks had taken place on an immense scale. The granitic and porphyritic rocks were dislocated and covered the slopes with masses of fresh *débris*. As to the softer deposits—clays and so on—which were still more softened by the very severe showers which preceded the earthquake, they were

flowing and gliding like glaciers on the slopes of the mountains. One of these masses, on the Aksai River, has a volume of no less than 10,000,000 cubic metres. The centre of the earthquake was at a depth of from 5000 to 8000 metres, and its projection on the surface of the earth of the most severely affected regions covers a surface about twenty-three miles long and three miles wide on the northern slope of the Alatau. The earthquake spread with greater force towards the north than to the south; thus the region of the greatest destruction extends for about twenty-five miles northwards, and for only ten or thirteen miles southwards; but the whole region where the earthquake was felt has a length of nearly 1000 miles from south-west to north-east, and about 600 miles from south-east to north-west. As to its cause, it obviously must be searched for in the interior movements of the rocks—not in volcanic agencies. Regular seismological stations in Turkistan and the Caucasus will probably be the immediate outcome of the work of the Committee.

In the *American Meteorological Journal* for May, Mr. Bôcher contributes an article on the labours of Dove, Redfield, and Espy, the greater part of whose work was included between the years 1830 and 1860. Redfield's first paper on the theory of storms was published in 1831, and was due to the fact of his having previously noticed, during a journey after a storm, that the trees were lying in opposite directions to those near his home. Espy supposed that the wind always blows inwards from the edge of the storm to a central point or line. He was a persistent opponent of Redfield. Dove's work on the theory of storms was essentially the same as Redfield's, but he also deals with the subject of winds in general. In a second article Mr. Rotch gives the description and history of the Sonnblick Mountain Observatory in Austria, and some of the preliminary results obtained. Mr. W. Upton contributes, on the part of the New England Meteorological Society, a very able paper on the remarkable storm which visited the eastern portion of the United States from the 11th to 14th of March last, and which is known as the New York "blizzard." Its peculiar characteristics were (1) the rapidity with which its energy was developed; (2) the excessive precipitation which accompanied it, principally as snow. West of the 72nd meridian it was almost wholly snow, piled up in immense drifts, making it absolutely impossible to measure it. East of this meridian it was snow and rain mixed. In a table giving the ratio of unmelted and melted snow it is shown that the density varied greatly, and furnishes proof that the method of assuming that 1.0 inch of snow equals 0.1 inch of rain is exceedingly erroneous. (3) The relatively small area of its maximum intensity. This storm was one of the most notable in this century over the Atlantic, and its behaviour over the ocean will be the subject of a special investigation by the United States Hydrographic Office.

THE Pilot Chart of the North Atlantic Ocean for the month of June shows that seven pronounced cyclonic storms passed over portions of the North Atlantic during May, but none appear to have traversed the entire ocean. Ice has been reported in increased quantity west of the 46th meridian, and, although confined for the most part to the coast of Newfoundland, it has been met with as far south as latitude 41° , in longitude $46^\circ W$. There has been a marked increase of fog over the Grand Banks and off the American coast north of Hatteras, while the amount encountered east of the 40th meridian has been unusually large. It is attributed almost entirely to the prevalence of southerly winds in that part of the ocean. During the past six months 51 vessels are known to have met with disaster in the North Atlantic ocean; the general drift of the logs of the great raft has been about east by south, and most of them are now about west-south-west from the Azores. Very few, if any, have drifted north of the 40th parallel. On April 10, latitude $41^\circ 59'$

N., longitude $47^{\circ} 30' W.$, Capt. McKay, of the s.s. *Pavonia*, saw a large waterspout travelling north-east at about 30 miles an hour. The great column of water reached up to a dense black, low-lying cloud, and was in shape like a huge hour-glass. It was accompanied by a terrific roaring. The spout broke, with a thunder and hail storm. Many pieces of ice, 4 to 6 inches in diameter, fell on board the ship. On the next day three distinct spouts were seen by another ship, about 250 miles north-east of the above position. These spouts gradually merged into one, and travelled out of sight.

FISHERMEN report that early on the morning of June 13 a waterspout was seen in the Grosses Haff, off Stettin. About 11.45 another one appeared near Danmausch. A steamer was, at the time, only 100 yards distant, and had to reverse her engines in order to escape it. Each lasted about a quarter of an hour.

SIR TERENCE O'BRIEN, Governor of Heligoland, in his report on the condition of that colony during the past year, states that at his instigation the Council of the Meteorological Department agreed to start a station there, and the Secretary, Mr. Scott, having gone over to superintend the putting up of the instruments, the observatory was established in August last, and will, he hopes, not only be of benefit to this branch of science, but will enable more accurate data than were formerly obtainable from the old and imperfect instruments at their disposal to be forthcoming in future Blue-book statistics.

IN a recording rain-gauge, recently devised by M. Brassard, the water passes from the bottom of the receiver into a centrally-pivoted trough, having each arm slightly depressed in the middle. It fills the two divisions alternately: the filled arm goes down, and empties itself into a lower trough, and the rocking thus caused is registered by an ordinary counter. Each rocking of the trough indicates one-tenth of a millimetre of water having fallen into the receiver. The instrument is designed to eliminate the error usually arising from evaporation.

ADVICES from the fishing village of Kerschkaranza, in the Kola Peninsula, on the White Sea, state that on January 5 a curious and destructive phenomenon occurred there. At 4 a.m. the inhabitants were awakened by a peculiar, dull, heavy detonation like that of distant artillery. Piled up to a height of several hundred feet, the ice—in consequence, no doubt, of the enormous pressure of the ocean ice without—was seen to begin moving from the north-west towards the shore. The gigantic ice wall moved irresistibly forward, and soon reached the shore and the village, which it completely buried, the ice extending a mile inland. The forward movement of the ice lasted four hours. No lives were lost.

ON April 29, when off the Westman Islands, Iceland, the captain of the Danish mail-steamer *Laura* threw overboard a letter written in Danish. On May 6 the letter was found in the stomach of a cod caught by a French fisherman off Reykjavik, about 120 miles distant. The man showed it to the French Consul at Reykjavik, who submitted it to the captain of the *Laura*. It was much decomposed, but still readable.

A LANCE, an axe, a sword—all of bronze—an urn, a couple of whetstones, and some human remains have been found in a mound at Ogue, on the south-west coast of Norway.

AT the last meeting of the Asiatic Society of Japan, Dr. Knott read a biographical note on Ino Chukey, the great Japanese surveyor and cartographer. The following summary is taken from the report of the *Japan Weekly Mail*:—Ino was born in 1744, but did not begin his scientific career till he was fifty years of age. Up to that time he was a successful brewer. Towards the close of the century he went to Yedo, and there studied astronomy under the elder and younger Takahashi. The latter is the man who was put on his trial in 1830 for having

exchanged maps of Yesso and Japan with Von Siebold for some books; the case, however, was never concluded, for he died in the meantime. In the year 1800, Ino began his work of surveying the coasts and islands of Japan, and for eighteen years he continued to labour at it, making in that time innumerable measurements of distance, and between 1100 and 1200 direct measurements of latitude. The wonder is that he did so much with such rude instruments as he had, which resembled those in use in the West in the sixteenth and seventeenth centuries. The records of his survey were compiled in 1821, and were published, under the authority of the Tokio University, in book form in 1870. In fact, the charts he constructed have been the basis of all maps that have since been made. About six or seven years ago, Ino was raised by Imperial decree to the rank of "Posthumous," or Senior Fourth Class, an honour seldom held in his time by any but nobles, and, moreover, posthumous honours are very rarely given. Ino might be named the Japanese Picard, the French astronomer who made the first good calculation of the size of the earth. The instruments—an azimuth circle and a quadrant—used by Ino in his survey were destroyed by fire, but exact copies of them, constructed in 1828, were exhibited at the meeting.

ACCORDING to the report of the Inspector of Schools in Hong Kong for the past year, the total number of schools subject to Government supervision was 94, as against 45 in 1877 and 13 in 1867; the numbers of scholars for the corresponding years being respectively 5974, 3144, and 700. Of the 5974 pupils who attended schools under Government supervision in 1887, 4160 attended missionary schools, and 1814 the Government undenominational establishments. In the colony there are five classes of schools: (1) Chinese, where a purely Chinese education is given; (2) Romanized Chinese, in which a European education is given in the Chinese language; (3) Portuguese, where a European education is given in the Portuguese language only; (4) Anglo-Chinese schools, numbering eight, with 1160 scholars; (5) English schools, numbering six, with 688 scholars, in which the children are taught in the English language only. The Government Central School presented 384 boys for the annual examination, and of these 375 passed—that is, the very high percentage of 97.65. At this latter school the subjects taught are: reading, dictation, arithmetic, Chinese into English, English into Chinese, grammar, geography, map-drawing, composition, Euclid, algebra, mensuration, history, and Latin.

MESSRS. EYRE AND SPOTTISWOODE, as the Government publishers, have issued two new volumes of the "Report on the Scientific Results of the Voyage of the *Challenger*": vol. xxiv. Zoology (2 parts, text and plates), Report on the Crustacea Macrura; vol. xxv. Zoology, Report on the Tetractinellida.

A PAPER on "Wasted Sunbeams," by Dr. G. M. Smith, of New York, has just been reprinted from the *Medical Record*. The author's aim is to show that great advantages to health might be secured by a rearrangement of the upper stories of private dwellings. "Cannot architectural ingenuity," he asks, "coached by sanitary science, contrive some method of using the thousands of acres of housetops, so that roofs, now so useful in affording indoor protection from cold, sleet, and rain, can be made additionally useful, at certain seasons, by affording outdoor recreation and protection from invalidism? Cannot the same skill contrive new designs for the upper and most salutary stories of our dwellings; playing-rooms and sunning-rooms, especially adapted for the winter season, but so cleverly fashioned that too intense torrid beams can be excluded in summer?"

MR. J. ELLARD GORE has in the press a volume entitled "Planetary and Stellar Studies: papers on the Planets, Stars,

and Nebulæ." It will be published shortly by Messrs. Roper and Drowley.

THE Fifteenth Annual Report of the progress of the Geological and Natural History Survey of Minnesota, by Mr. N. H. Winchell, State Geologist, has been issued. This Report relates chiefly to the geology of the iron-bearing rocks. It seems that during the last two years great interest has been manifested with regard to the iron industry in Northern Minnesota.

WE have received Part 3 of the twenty-first volume of the Journal and Proceedings of the Royal Society of New South Wales. Among the contents are papers on Port Jackson silt beds, by F. B. Gipps; some New South Wales tan-substances, parts 3 and 4, by J. H. Maiden, Curator of the Technological Museum, Sydney; soils and subsoils of Sydney and suburbs, by J. B. Henson; quarantine and small-pox, by J. Ashburton Thompson; on the presence of fusel-oil in beer, by W. M. Hamlet; autographic instruments used in the development of flying-machines, by Lawrence Hargrave.

PART I of the seventh volume of the "Encyclopædic Dictionary" (Cassell and Co.) has just been issued. This carefully-compiled work, as we have repeatedly had occasion to note, contains all the words in the English language, with a full account of their origin, meaning, pronunciation, and use. Great pains are taken to secure that scientific terms shall be properly explained.

MESSRS. OLIVER AND BOYD are about to publish "India in 1887, as seen by Robert Wallace, Professor of Agriculture and Rural Economy in the University of Edinburgh." The author was four months in India and Ceylon, and made inquiry as to the breeds of cattle and horses, and as to the condition of native agriculture, soils, irrigation, &c. The work contains 290 illustrations. Prof. Wallace especially wished to "learn in an unmistakable manner what fruits the Cirencester College training had borne."

WE have received Parts 1 and 2 of "The Speaking Parrots," by Dr. Karl Russ (Upcott Gill). Much useful information is given as to the purchase and reception of parrots, the cages in which they ought to be kept, their food, the best way of taming and training them, the preservation of their health, and as to their diseases.

AN Australian edition of Longmans' "School Geography," by Mr. George G. Chisholm, has just been issued. For this edition the sections on Australasia and the British Isles have been entirely re-written, and modifications have been made in other parts of the text with the view of calling attention to matters of special interest in Australia and New Zealand.

A NEW catalogue of mathematical works has been issued by Messrs. Dulau and Co.

THE current number of the *Technology Quarterly* opens with an interesting paper, by Mr. James P. Munroe, on the beginning of the Massachusetts Institute of Technology. The Institute was legally established on April 10, 1861, after more than two years of almost constant effort in the face of opposition and discouragement.

IT has been decided that the Miss Williams Scholarship for Women, of the annual value of £20, tenable for three years, shall be offered at the entrance scholarship examination at University College, Cardiff, on September 18, and that it may be held with a College exhibition. As it is specially intended to encourage the higher education of women in Wales, preference will be given to the children of Welsh parents.

A COLLECTION of American pottery for the American National Museum is about to be made by Dr. David T. Day of the United States Geological Survey. *Science* says that the collection of

Sèvres pottery presented by the French Government is an exceedingly fine one, as is also that of Japanese ceramics; and the department of Indian pottery is not approached elsewhere in the world. But the Museum possesses very little modern American pottery.

THE additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mr. A. B. Parker; a Larger Hill-Mynah (*Gracula intermedia*) from North India, presented by Mrs. M. von Kornatzki; two Naked-footed Owlets (*Athene noctua*) from France, presented by Miss Pierce; a Swainson's Lorikeet (*Trichoglossus nova-hollandia*) from Australia, presented by Mr. H. A. Hankey; two Loggerhead Ducks (*Tachyeres cinereus*) from the Falkland Islands, presented by Mr. Archibald McCall; a Dnyker-bok (*Cephalophus mergens* ♀) from South Africa, a Red-legged Partridge (*Caccabis rufa*), a Barbary Partridge (*Caccabis petrosa*), five — Pigeons (*Columba ballii*) from Teneriffe, deposited; a Bennett's Wallaby (*Halmaturus bennetti* ♀), two Long-fronted Gerbilles (*Gerbillus longifrons*) born in the Gardens; a Yellow-legged Herring Gull (*Larus cachinnans*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN.

ROTATION PERIOD OF THE SUN FROM FACULÆ.—The fifth part of vol. iv. of the Publications of the Astrophysical Observatory at Potsdam has recently appeared, and contains a determination by Dr. J. Wilsing of the rotation period of the sun from observations of faculæ. The previous determinations of the solar rotation have been based upon observations of the spots, or upon the relative displacement of lines in the spectra of the east and west limbs, for, as faculæ can usually only be seen well when near the limb, and therefore can seldom be watched for more than three consecutive days, and as they often undergo rapid changes, they did not seem well suited for such a discussion. Their irregular and often straggling shapes, too, render measures of their positions much less precise than those of spots. Notwithstanding these difficulties Dr. Wilsing's inquiry seems to have met with a measure of success. Of the faculæ shown on the solar photographs taken at Potsdam from 1884 March 14 to August 31, 144 groups were seen at three or more different epochs, at intervals of one or more semi-rotations. Arranging these according to their distribution in solar latitude, in zones of 3° wide, Dr. Wilsing finds practically the same rotation period for each zone from +24° to -33°, the difference from the mean of the daily angular motion only exceeding 2' in a single instance, and in many cases amounting only to 20" or 30". As these differences are so small and follow no law, it would appear that, whilst, as Carrington and Spoerer have shown, the different spot zones have different rates of rotation, the layer of the faculæ rotates as a whole. Since the faculæ are certainly at a higher level than the spots, this conclusion is one which will fail to be accepted until we have much further and more convincing evidence than we have at present. In the present discussion it sometimes happens that a group of faculæ is considered as identical with an earlier group seen two or three semi-rotations earlier, when the same part of the sun has been seen in the interval, but without showing the group, although the district has been favourably presented for displaying faculæ. In such a case, and particularly if several semi-rotations have elapsed, the two groups will be identified or not according to the rotation period assumed; so that if a single rotation period for the whole sun be assumed in the preliminary reductions of position for the sake of identification of the groups, there will be an inevitable tendency towards a single rotation period in the final result.

The mean daily angular velocity given by the faculæ is 14° 16' 11".3, corresponding to a sidereal period of 25d. 5h. 28m. 12s., the values for the northern and southern hemisphere, taken separately, differing only by 11".5. It is worthy of note that this corresponds to the rotation period of spots about latitude 10°, as given alike by Carrington and Spoerer's formulæ, and that the two zones 5° to 15° yield the greater number both of spots and faculæ which are available for these investigations. The present discussion, with whatever reserve its conclusions are to be accepted,